REMARKS

In the Office Action dated September 22, 2004, claims 1-20 were pending. In the Office Action, the Examiner rejected all of the 20 pending claims.

Applicant notes that claims 2-3, 7-8, and 19 have been canceled. Additionally, claims 1, 4-6, 9-18, and 20 have been amended accordingly. Further new claim 21 has been added. The Examiner's careful consideration of the amended claims is respectfully requested.

Because one of the claims cancelled by this amendment, claim 8, was an independent claim, and only one new claim has been added, claim 21, which is an independent claim, Applicant does not believe any further claim fee is due for this amendment. However, in the event the examiner finds a fee for additional claims, or any other matter, is required, Applicant hereby authorizes the Commissioner to charge **Deposit Account No. 14-0116** for such fees.

The following remarks are set forth in the same order as in the Office Action.

Detailed Action

The Examiner indicated in the Office Action dated September 22, 2004 that claims 1-20 were originally presented for consideration. Applicant notes that claims 2-3, 7-8, and 19 have been cancelled.

Information Disclosure Statement

Applicant acknowledges that the Examiner has considered the information disclosure statement previously submitted.

Claim Rejections Under 35 U.S.C. § 102

Miyamoto

The Examiner rejected claims 1-3, 6, 8-16 and 19-20 under 35 U.S.C. § 102(b) as being anticipated by Miyamoto. (U.S. Patent Application Publication 2002/0031603). The Examiner notes that Miyamoto discloses a composite made from a 2 mm thick layer of NiAl on a 2mm thick stainless steel plate. The Examiner further notes that Miyamoto discusses turbine blades as a use of the invention and high strength, heat resistance, wear and abrasion resistance of the composite.

With regard to claim 1, applicant notes that all claim limitations must be considered. Applicant has noted the Examiner's rejection of the subject claim. Applicant further notes that claim 1 has been amended to limit the claim to a specific rocket component, namely a combustion chamber for a rocket having a claimed physical structure; namely being a substantially enclosed, hollow body, having a rocket propellant inlet and an exhaust outlet and having walls comprised of first and second structural layers. This amendment is supported in the specification on page 5, lines 27-28 and page 8, lines 11-12. The additional structure of the combustion chamber disclosed in claim 1 is argued to be inherent in rocket combustion chambers.

Applicant notes that Miyamoto does not disclose use of its invention in the construction of a rocket combustion chamber. It is well known that rocket combustion chambers are high pressure environments. The present application clearly teaches that each inventive structural layer "is load bearing and contributes substantially to ... overall integrity." Page 8, lines 29-30. The subject application distinguishes prior art references that teach NiAl coatings on grounds that such references do not teach the use of NiAl layers as "structural, i.e. load bearing" layers. Page 4, lines 21-24. Miyamoto does not teach that a bimetallic or intermetallic material comprised of NiAl and stainless steel imparts load bearing properties and structural integrity necessary in the construction of a rocket combustion chamber. In fact, Miyamoto specifically does not include aluminum and other Group 3B metals as exemplary substances suitable "when it is intended to improve the properties [of the intermetallic compound] as a high-temperature *structural material...*" See paragraph 0070 (emphasis added). That Miyamoto does not included aluminum as an example of a substance suitable for improving structural materials argues against concluding that Miyamoto teaches the use of aluminum-containing bimetallic

compounds as high temperature, *structural*, load bearing materials, such as are taught in the present application. Further, the exemplary uses of the invention taught by Miyamoto in paragraph 0001 do not include any apparatuses that are designed to contain significant pressures such as are found in rocket combustion chambers. Thus, it is argued that Miyamoto not only does not expressly teach use of its invention in the construction of rocket combustion chambers, but also does not over contemplate the use of its invention in the construction of rocket combustion chambers.

Applicant asserts that the limitation of the present invention in claim 1, to a rocket combustion chamber, distinguishes the claim over the prior art. Inasmuch, applicant contends that the rejection to claim 1 has been overcome.

Applicant notes that claims 2 and 3 have been cancelled. Inasmuch, the rejection of the subject claims is overcome.

With regard to claims 4-6, applicant notes that all claim limitations must be considered. Applicant further notes that claims 4-6 depend from claim 1. In that claim 1 has been amended to include additional claim limitations and in that arguments have been submitted in support of allowing claim 1, applicant asserts that the rejections of claims 4-6 have been overcome. Inasmuch, the Examiner's careful consideration is respectfully requested.

Applicant notes that claims 7 and 8 have been cancelled. Inasmuch, the rejection of the subject claims is overcome.

With regard to claim 9, applicant notes that claim 9, as with claim 1, has been amended to limit the claim to a specific rocket component, namely a combustion chamber for a rocket having a claimed physical structure; namely being a substantially enclosed, hollow body having walls comprised of first and second structural layers. In that claim 9 has been amended to include additional claim limitations similar to those incorporated into claim 1 and in that arguments have been submitted in support of allowing claim 1 based on revisions similar to those made in claim 9, applicant asserts that the rejection of claim 9 has been overcome.

With regard to claims 10-18 and 20, applicant notes that all claim limitations must be considered. Applicant further notes that claims 10-18 and 20 depend from claim 9. In that claim 9 has been amended to include additional claim limitations and in that arguments have been submitted in support of allowing claim 9, applicant asserts that the rejections of claims 10-18 and 20 have been overcome. Inasmuch, the Examiner's careful consideration is respectfully requested.

Baranow

The Examiner rejected claims 1-2, 6, 8-16 and 19-20 under 35 U.S.C. § 102(b) as being anticipated by Baranow. (U.S. Patent No. 3,625.750). The Examiner notes that Baranow discloses a turbine blade whose thickness appears to be half nickel aluminide and half nickel or cobalt-based superalloy.

With regard to claim 1, applicant notes that all claim limitations must be considered. Applicant has noted the Examiner's rejection of the subject claim. Applicant further notes that claim 1 has been amended to provide that the first structural layer has a thickness of "at least about 20 mils." This reflects the incorporation of the limitation of former claim 3, which was not originally rejected, into claim 1.

Baranow teaches providing articles with an outer coating of NiAl or CoAl. Col. 1, lines 1-4. Exemplary thicknesses of such coatings taught in Baranow are 1.75 mils to a maximum of 3.5 mils. Col. 2, lines 10-11. These thicknesses are substantially dissimilar to the approximately 20 mils thicknesses taught in the present application and claim 1 specifically. Moreover, Baranow does not teach using such coatings as structural, i.e., load bearing layers.

Applicant asserts that the limitation of the present invention in claim 1, to a rocket combustion chamber having a first structural layer that is about 20 mils thick, distinguishes the claim over the prior art. Inasmuch, applicant contends that the rejection to claim 1 has been overcome.

Applicant notes that claim 2 has been cancelled. Inasmuch, the rejection of the subject claims is overcome.

With regard to claim 6, applicant notes that all claim limitations must be considered. Applicant further notes that claim 6 depends from claim 1. In that claim 1 has been amended to include additional claim limitations and in that arguments have been submitted in support of allowing claim 1, applicant asserts that the rejections of claim 6 has been overcome. Inasmuch, the Examiner's careful consideration is respectfully requested.

Applicant notes that claim 8 has been cancelled. Inasmuch, the rejection of the subject claim is overcome.

With regard to claim 9, applicant notes that claim 9, as originally drafted, included the limitation of claim 3, which was not rejected. Specifically, claim 9 includes the limitation that the first and second structural layers are each at least bout 20 mils thick. This limitation was not rejected in original claim 3 and it is argued that claim 9 should not have been rejected for having the same limitation. In that claim 9 has claim limitations similar to those incorporated into unrejected, now cancelled, claim 3, applicant asserts that the rejection of claim 9 should be withdrawn.

With regard to claims 10-16 and 20, applicant notes that all claim limitations must be considered. Applicant further notes that claims 10-16 and 20 depend from claim 9. In that claim 9 should not have been rejected, applicant asserts that the rejections of claims 10-16 and 20 have been overcome. Inasmuch, the Examiner's careful consideration is respectfully requested.

Applicant notes that claim 19 has been cancelled. Inasmuch, the rejection of the subject claim is overcome.

Miller

The Examiner rejected claims 1-2, 6, 8-16 and 19-20 under 35 U.S.C. § 102(b) as being anticipated by Miller. (U.S. Patent No. 3,653.976). The Examiner notes that miller discloses a turbine blade whose thickness appears to be half nickel aluminide and half nickel or cobalt-based superalloy.

With regard to claim 1, applicant notes that all claim limitations must be considered. Applicant has noted the Examiner's rejection of the subject claim. Applicant further notes that claim 1 has been amended to limit the claim to a specific rocket component, namely a combustion chamber for a rocket having a claimed physical structure; namely being a substantially enclosed, hollow body, having walls comprised of first and second structural layers. This amendment is supported in the specification on page 5, lines 27-28 and page 8, lines 11-12. The additional structure of the combustion chamber disclosed in claim 1 is argued to be inherent in rocket combustion chambers. It is further noted that the term "structural layer," which is used in claim 1 with respect to the NiAl or NiAl alloy layer is defined in the application as having the quality of being "load bearing". Page 8. lines 26-30. This load bearing property is consistent with and important to its use in a combustion chamber which must contain very high pressures.

Miller discloses using a nickel aluminide layer on "either the leading or trailing edge of the structure, or both." Column 1, lines 56-57. Figure 3 depicts nickel aluminide only on the leading and trailing edges of a turbine blade. Miller states that, with respect to a turbine blade, "the major portion of the structure...is formed by investment casting nickel base super alloy." Column 1, lines 58-60. This teaching differs substantially from the invention of the present application which teaches that the NiAl layer is a structural layer directed to and integral to the structural integrity of the combustion chamber.

Miller does not teach use of a NiAl layer in a pressure containing chamber, such as a combustion chamber and the fact that Miller may show a NiAl layer which is as thick as the walls (elsewhere) of the turbine blade, does not evidence that the walls of the turbine blade are sufficiently thick to be safe equivalents to the walls of a rocket combustion chamber. Thus, applicant disagrees with the Examiner's reliance that "the thickness of Miller's NiAl component would have structural integrity since it as thick as the walls of the turbine blade" as a means of rejecting the subject application. As amended, claim 1 is limited to a rocket combustion chamber which, by design, contains a high pressure environment. A turbine blade does not have this function. Thus, the structural integrity of the Miller NiAl layer cannot be compared to the

required structural integrity of the present application's NiAl layer where there is no reference to thickness in the Miller patent.

Applicant asserts that the limitation of the present invention in claim 1, to a rocket combustion chamber having a first *structural* layer that is comprised of NiAl or a NiAl alloy, distinguishes the claim over the prior art. Inasmuch, applicant contends that the rejection to claim 1 has been overcome.

Applicant notes that claim 2 has been cancelled. Inasmuch, the rejection of the subject claims is overcome.

With regard to claim 6, applicant notes that all claim limitations must be considered. Applicant further notes that claim 6 depends from claim 1. In that claim 1 has been amended to include additional claim limitations and in that arguments have been submitted in support of allowing claim 1, applicant asserts that the rejections of claim 6 has been overcome. Inasmuch, the Examiner's careful consideration is respectfully requested.

Applicant notes that claim 8 has been cancelled. Inasmuch, the rejection of the subject claim is overcome.

With regard to claim 9, applicant notes that claim 9 includes the limitation of a NiAl or NiAl alloy structural layer as part of the walls of the combustion chamber. As discussed with respect to claim 1, the load bearing quality of the NiAl or NiAl alloy structural layer, which is taught in the subject application, is not taught in Miller. Accordingly, applicant asserts that the rejection of claim 9 should be withdrawn.

With regard to claims 10-16 and 20, applicant notes that all claim limitations must be considered. Applicant further notes that claims 10-16 and 20 depend from claim 9. In that claim 9 has been amended to include additional claim limitations and in that arguments have been submitted in support of allowing claim 9, applicant asserts that the rejections of claims 10-18 and 20 have been overcome. Inasmuch, the Examiner's careful consideration is respectfully requested.

Applicant notes that claim 19 has been cancelled. Inasmuch, the rejection of the subject claim is overcome.

Lee

The Examiner rejected claims 1-2, 6, 8-16 and 19-20 under 35 U.S.C. § 102(b) as being anticipated by Lee. (U.S. Patent No. 5,348,446). The Examiner notes that Lee discloses a turbine blade composite having a nickel aluminide component that appears to be similar to the thickness of the adjoining nickel superalloy component.

Applicant's discussion with respect to United States Patent No. 3,653,967 is applicable to distinguishing Miller and is, therefore, incorporated herein. Lee does not teach the construction of a rocket combustion chamber. Moreover, Lee teaches the incorporation of NiAl at the leading and trailing edges of a turbine blade. Col 3, lines 38-46. Using NiAl in this manner does not provide load bearing support to the turbine blade, which is a quality of the structural layer taught in the present application (as discussed above).

Applicant asserts that the limitation of the present invention in claim 1, to a rocket combustion chamber having a first *structural* layer that is comprised of NiAl or a NiAl alloy, distinguishes the claim over the prior art. Inasmuch, applicant contends that the rejection to claim 1 has been overcome.

Applicant notes that claim 2 has been cancelled. Inasmuch, the rejection of the subject claims is overcome.

With regard to claim 6, applicant notes that all claim limitations must be considered. Applicant further notes that claim 6 depends from claim 1. In that claim 1 has been amended to include additional claim limitations and in that arguments have been submitted in support of allowing claim 1, applicant asserts that the rejections of claim 6 has been overcome. Inasmuch, the Examiner's careful consideration is respectfully requested.

Applicant notes that claim 8 has been cancelled. Inasmuch, the rejection of the subject claim is overcome.

With regard to claim 9, applicant notes that claim 9 includes the limitation of a NiAl or NiAl alloy structural layer as part of the walls of the combustion chamber. As discussed with respect to claim 1, the load bearing quality of the NiAl or NiAl alloy structural layer, which is taught in the subject application, is not taught in Lee. Accordingly, applicant asserts that the rejection of claim 9 should be withdrawn.

With regard to claims 10-16 and 20, applicant notes that all claim limitations must be considered. Applicant further notes that claims 10-16 and 20 depend from claim 9. In that claim 9 has been amended to include additional claim limitations and in that arguments have been submitted in support of allowing claim 9, applicant asserts that the rejections of claims 10-18 and 20 have been overcome. Inasmuch, the Examiner's careful consideration is respectfully requested.

Applicant notes that claim 19 has been cancelled. Inasmuch, the rejection of the subject claim is overcome.

Claim Rejections Under 35 U.S.C. § 103

The Examiner rejected claim 7 under 35 U.S.C. § 103(a) as being unpatentable over Miyamoto (U.S. Patent Application Publication 2002/0031603). The Examiner further stated that though Miyamoto does not specifically disclose a combustion chamber, the disclosure of a material for use in a turbine and aerospace equipment it obvious to use the invention of Miyamoto in any high temperature turbine or aerospace equipment uses.

As noted in the previous discussion of Miyamoto under §102 rejections, Claim 1 has been amended to disclose a particular structure, namely a rocket combustion chamber. Such a chamber is a high pressure environment. While heat resistance and corrosion resistance are important qualities of the NiAl structural layer taught in claim 1 of the subject application, the

term "structural layer" refers to a load bearing layer that that contributes substantially to the overall integrity of the combustion chamber. Page 8, lines 29-30. Miyamoto does not teach that a NiAl layer has this quality. Indeed, as discussed above, Miyamoto specifically does not include aluminum and other Group 3B metals as exemplary substances suitable "when it is intended to improve the properties [of the intermetallic compound] as a high-temperature *structural material...*" See paragraph 0070 (emphasis added). Miyamoto identifies other materials for use in such an application. Combustion chambers have unique structural requirements not found in turbine blades. The structural integrity of the combustion chamber depends, in part, on the ability of the walls of the chamber to withstand the high pressure environment. This is a different quality than mere heat or erosion resistance – a quality not taught in Miyamoto, but taught in the subject application and claimed in claim 1. Applicant asserts that the amendments to claim 1 distinguished over the prior art. Inasmuch, applicant contends that the rejection to claim 1 has been overcome.

The Examiner rejected claims 1-20 under 35 U.S.C. § 103(a) as being unpatentable over Miyamoto (U.S. Patent Application Publication 2002/0031603), in view of Barrett (U.S. Patent Number 4,610,736) or Liu (U.S. Patent Number 5,725,691). The Examiner concedes that Miyamoto does not disclose the addition of Zr to the NiAl material, but that either Barrett or Liu teaches minor additions of Zr to nickel aluminide compositions to improve certain qualities.

Applicant has previously presented arguments above that it believes are sufficient to distinguish claims 1-3 and 6–20 over Miyamoto, either by claim amendment, argument or cancellation of the claim. Both Liu and Barrett have been cited only with respect to claims 4 and 5 relating to the claim limitation of Zr. Neither Liu nor Barrett teaches the thicknesses of a NiAl layer as part of a bimetallic material, such as is taught in claims 1-3 and 6–20. Therefore, Applicant contends that the rejection to claims 1-3 and 6–20 have been overcome.

With respect to claim 4 and 5, these claims are dependant from claim 1 and all claim limitations must be considered. In that claim 1 has been amended to include claim further claim limitations and in that arguments have been cited for allowing claim 1 over Miyamoto in light of

Liu or Barrett, applicant asserts that the rejections of claims 4 and 5 have been overcome. The Examiner's careful consideration of the amended changes is respectfully requested.

The Examiner rejected claims 1-20 under 35 U.S.C. § 103(a) as being unpatentable over Miller (U.S. Patent Number 3,653,976) in view of Barrett (U.S. Patent Number 4,610,736) or Liu (U.S. Patent Number 5,725,691). The Examiner concedes that Miller does not disclose the addition of Zr to the NiAl material, but that either Barrett or Liu teaches minor additions of Zr to nickel aluminide compositions to improve certain qualities.

Applicant has previously presented arguments above that it believes are sufficient to distinguish claims 1-3 and 6–20 over Miller, either by claim amendment, argument or cancellation of the claim. Both Liu and Barrett have been cited only with respect to claims 4 and 5 relating to the claim limitation of Zr. Neither Liu nor Barrett teaches the thicknesses of a NiAl layer as part of a bimetallic material, such as is taught in claims 1-3 and 6–20. Therefore, Applicant contends that the rejection to claims 1-3 and 6–20 have been overcome.

With respect to claim 4 and 5, these claims are dependant from claim 1 and all claim limitations must be considered. In that claim 1 has been amended to include claim further claim limitations and in that arguments have been cited for allowing claim 1 over Miller in light of Liu or Barrett, applicant asserts that the rejections of claims 4 and 5 have been overcome. The Examiner's careful consideration of the amended changes is respectfully requested.

The Examiner rejected claims 1-20 under 35 U.S.C. § 103(a) as being unpatentable over Lee (U.S. Patent Number 5,348,446) in view of Barrett (U.S. Patent Number 4,610,736) or Liu (U.S. Patent Number 5,725,691). The Examiner concedes that Lee does not disclose the addition of Zr to the NiAl material, but that either Barrett or Liu teaches minor additions of Zr to nickel aluminide compositions to improve certain qualities.

Applicant has previously presented arguments above that it believes are sufficient to distinguish claims 1-3 and 6–20 over Lee, either by claim amendment, argument or cancellation of the claim. Both Liu and Barrett have been cited only with respect to claims 4 and 5 relating to

the claim limitation of Zr. Neither Liu nor Barrett teaches the thicknesses of a NiAl layer as part of a bimetallic material, such as is taught in claims 1-3 and 6–20. Therefore, Applicant contends that the rejection to claims 1-3 and 6–20 have been overcome.

With respect to claim 4 and 5, these claims are dependant from claim 1 and all claim limitations must be considered. In that claim 1 has been amended to include claim further claim limitations and in that arguments have been cited for allowing claim 1 over Lee in light of Liu or Barrett, applicant asserts that the rejections of claims 4 and 5 have been overcome. The Examiner's careful consideration of the amended changes is respectfully requested.

Newly Added Claims

Applicant has added new Claim 21. Claim 21 is directed to a rocket engine assembly having a combustion chamber with the limitations disclosed in claim 1 and a nozzle constructed of the same structural layers as are used in conjunction with the combustion chamber. This is supported in the specification on page 8, lines 11-12 and former claim 7. It is known that at least a portion of the nozzle in a rocket engine assembly is subject to the high pressure found in the combustion chamber, thus the selection of materials used in the layers of the wall of each of these components is directed toward load bearing and structural integrity. The use of NiAl and NiAl alloy load bearing layers in a rocket engine assembly- specifically a combustion chamber/nozzle assembly is not taught by any of the prior art references cited by the Examiner for the reasons set forth above.

Conclusion

In the Office Action dated September 22, 2004, the Examiner rejected pending claims 1-20. Applicant has canceled claims 2-3, 7-8 and 19. Applicant has further added new claim 21. Additionally, claims have been amended according to the Examiner's recommendations and arguments were presented in support of allowing the amended changes. Applicant now believes that this amendment complies with 37 CFR § 1.121 and thus requests examination of this

Amendment. Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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